



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/SE99/00964 <b>(22) International Filing Date:</b> 4 June 1999 (04.06.99) <b>(30) Priority Data:</b> 9802077-9      11 June 1998 (11.06.98)      SE <b>(71) Applicant (for all designated States except US):</b> SCA HYGIENE PRODUCTS AB [SE/SE]; S-405 03 Göteborg (SE). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> WALLSTRÖM, Leif [SE/SE]; Geteryggsgatan 14, S-416 78 Göteborg (SE). <b>(74) Agent:</b> GÖTEBORGS PATENTBYRÅ DAHLS AB; Sjöporten 4, S-417 64 Göteborg (SE).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Swedish).</i>
<b>(54) Title:</b> ABSORBENT STRUCTURE  <div data-bbox="446 1134 1209 1480" data-label="Image"> </div> <b>(57) Abstract</b> <p>An absorbent structure in an absorbent article such as a diaper, incontinence guard, sanitary napkin, wound dressing, bed protection and the like, formed from at least two superposed layers (5'; 5'') of one or more web-shaped absorption materials (5), said layers (5'; 5'') having different widths as seen in the transverse direction of the article. The absorbent structure (4) comprised of said layers has been compressed to a thickness which is substantially the same over the width of the structure, in such a way that the structure has a higher density in the areas thereof where the layers overlap each other and a lower density in other areas.</p>		

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## ABSORBENT STRUCTURE

### *Technical field*

The present invention refers to an absorbent structure in an absorbent article such as a  
5 diaper, incontinence guard, sanitary napkin, wound dressing, bed protection and the  
like, formed from at least two superposed layers of one or more web-shaped absorption  
materials. The invention further refers to a method for manufacturing the absorbent  
structure.

### 10 *Background of the invention*

Many different types of absorbent structures in absorbent articles of the above  
mentioned kind are previously known. They usually consist of one or more compressed  
layer of cellulosic fluff pulp, often in combination with so called superabsorbents,  
which are polymers with the capacity to absorb water or body liquids many times their  
15 own weight. Other types of absorbent structures are airlaid cellulosic fibrous webs  
which have been bound with a bonding agent, e.g. latex, heat meltable bonding fibers or  
the like, dry formed reel pulp according to WO 90/0508, absorbent foam materials etc.

The body liquid is discharged to the absorbent article in a very limited area, the so  
20 called wetting point. It shall from there be distributed further to unutilized portions of  
the absorbent structure. Above all it is desired to have a distribution of liquid in the  
longitudinal direction of the article, while spreading towards the longitudinal edges can  
give edge leakage, which should be avoided. In order to enhance the liquid distribution  
in the longitudinal direction it is known to have special distribution layers in the  
25 absorbent article and/or to compress this in patterns in the form of longitudinal  
compression lines, along which the liquid can be easily distributed.

Through EP 0 481 322 there is known an absorbent structure made from a web-shaped  
absorption material which in its initial position has an even density and thickness in the  
30 xy-direction and which has been compressed to a higher density and by that a lower  
thickness in certain areas. The material is then folded together to form at least two

layers which have different densities. In this way an absorbent structure having different densities in the z-direction can be produced.

*Object and most important features of the invention*

5 The object of the present invention is to provide an absorbent structure in an absorbent article of the above mentioned kind, in which it in a simple way is possible to create areas of different densities in the xy-direction of the structure. This has according to the invention been provided by the fact that the structure comprises at least two superposed layers of one or more web-shaped absorption materials, said layers having different  
10 widths as seen in the cross direction of the article and that the absorbent structure comprised of said layers has been compressed to a thickness which is substantially the same over the width of the structure, in such a way that the structure has a higher density in the areas thereof where the layers overlap each other and a lower density in other areas.

15 The layers can either be formed from one and the same web-shaped absorption materials which have been folded to the desired configuration or alternatively be formed from separate pieces of the web-shaped material, which either can be the same in the different layers or different.

20 The invention further refers to a method for manufacturing an absorbent article, at which at least two layers of one or more web-shaped absorption materials are placed superposed to each other, said layers having different widths as seen in the transverse direction of the article and that the absorbent structure comprised of said layers is  
25 compressed to a thickness which is substantially the same over the width of the structure, in such a way that the structure will have a higher density in the areas thereof where the layers overlap each other and a lower density in other areas.

30 Further features of the invention are disclosed in the following description and from the claims.

*Description of the drawings*

The invention will in the following be closer described with reference to some embodiments shown in the accompanying drawings.

Fig. 1 shows in a view from above an absorbent article in the form of a sanitary napkin.

5 Fig. 2 is a section according to the line II-II in Fig. 1.

Fig. 3 shows schematically an irregularly folded absorption material forming the start point for an absorbent structure according to the invention.

Fig. 4 shows schematically strips of a web-shaped absorption material of different widths placed superposed to each other and forming the start point for an absorbent structure according to the invention.

10 Fig. 5 shows schematically an absorbent structure with different densities in different areas obtained by compressing the material shown in Fig. 3 or Fig. 4.

*Description of embodiments*

15 Fig. 1 and 2 shows an embodiment of a sanitary napkin 1 comprising a liquid pervious topsheet 2, a liquid impervious backsheet 3 and an absorbent body 4 arranged therebetween. Further layers be included, such as liquid acquisition layers, distribution layers etc.

20 It should be pointed out that the sanitary napkin shown in the drawings only constitutes a non-limiting example of an absorbent article. Thus the shape and construction of the article may vary. The absorbent article can also consist of a diaper, a pant diaper, an incontinence guard, a wound dressing, a bed protection and the like.

25 The liquid pervious topsheet 2 may consist of a nonwoven material, for example a spunbond material of synthetic filament, a meltblown material, a thermobonded material or a bonded carded fibrous web. Alternatively it may consist of a perforated plastic film or a perforated laminate of nonwoven or plastic film.

The liquid pervious backsheet 3 may consist of a plastic film, a nonwoven material which is coated with a liquid impervious material or a hydrophobic nonwoven material which resists liquid penetration.

5 On the underside of the liquid impervious backsheet 3 fastening means in the form of longitudinal strings 6 of adhesive glue are provided. The glue areas are preferably before use covered with a releasable protective strip (not shown) of paper or plastic film treated with a release agent. In the shown embodiment the fastening means consist of longitudinal glue areas. A plurality of other glue patterns, e g crosswise, are of course  
10 possible as well as other types of fastening means such as Velcro-type, press buttons, girdles, special underpants and the like.

The sanitary napkin in the shown embodiments is hourglass shaped with broader end portions 7 and a narrow crotch portion 8. The crotch portion 8 is the portion of the  
15 sanitary napkin which during use is intended to be placed in the crotch area of the user and serve as a receiving surface for the discharged body fluid.

The topsheet 2 and the backsheet 3 have a somewhat larger extension in the plane of the absorbent body 4 and extend outside the edges thereof. The layers 2 and 3 are  
20 interconnected within the projecting portions, e g by gluing or welding with ultrasonic or heat.

The absorbent body 4 can be of an optional web-shaped absorption material 5, such as airlaid cellulosic fibers which have been bonded with a bonding agent, e g latex, heat  
25 meltable bonding fibers or the like, dry-formed reel pulp according to WO 90/0508, sheets of absorbent foam material etc. A certain amount of superabsorbent material may possibly be incorporated in the absorption material.

The absorption material 5 according to the embodiment shown in Fig. 3 is irregularly  
30 folded in zigzag-shape along five folding lines, in such a way that six layers 5' are formed which have different widths. The outer of these layers 5' have the smallest

width while the innermost layers have the largest width. The configuration of the irregular folding can of course be varied in many different ways, of which the shown only is one example. The irregularly folded web-shaped absorption material forms the start point for the production of the absorbent structure according to the invention.

5

In the embodiment shown in Fig. 4 three separate strips 5'' of a web-shaped absorption material have been placed in superposed relationship. These strips have three different widths and can be of the same or of different web-shaped absorption materials. Besides they have different lengths.

10

Upon compressing any of the materials composed of several layers according to Fig. 3 or 4 to an even thickness the portions that consist of the most layers will have a density which is higher than that of the portions that consist of fewer layers. In the shown embodiments the middle portion 9 will have the highest density and the immediately outside said middle portion located side portions 10 will have a higher density, while the outermost edge portions 11 will have the lowest density.

15

Since liquid is more rapidly distributed in smaller capillaries, which means a more rapid distribution with an increased density, the liquid will at first hand be distributed along the hardest compressed middle portion 9, while the outside this located portions 10 and 11 will serve as a kind of safety zones, which mainly are utilized when the middle portion is saturated with liquid. With such a construction of the absorbent article edge leakage from the longitudinal edges of the article can be minimized. If the layers also have different lengths as is shown in Fig. 4, the risk for edge leakage from the transverse edges of the article is also minimized.

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The different material layers can be compressed together in a pattern for forming longitudinal compression lines, at which the liquid distribution in the longitudinal direction is further improved.

30

### Claims

1. An absorbent structure in an absorbent article such as a diaper, incontinence guard, sanitary napkin, wound dressing, bed protection and the like, formed from at least two  
5 superposed layers (5';5'') of one or more web-shaped absorption materials (5),  
c h a r a c t e r i z e d i n  
that said layers (5';5'') of the web-shaped absorption material(-s) (5) have different  
widths as seen in the cross direction of the article and that the absorbent structure (4)  
comprised of said layers has been compressed to a thickness which is substantially the  
10 same over the width of the structure, in such a way that the structure has a higher  
density in the areas thereof where the layers overlap each other and a lower density in  
other areas.
2. Absorbent structure according to claim 1,  
15 c h a r a c t e r i z e d i n  
that said layers (5') are formed from one and the same web-shaped absorption materials  
(5) which has been folded to the desired configuration.
3. Absorbent structure according to claim 2,  
20 c h a r a c t e r i z e d i n  
that the web-shaped absorption material is folded in zigzag-shape in such a way that the  
structure in a middle portion (9) comprises more layers than in the longitudinal edge  
portions (11), at which the structure has a higher density in the middle portion than in  
the edge portions.
- 25 4. Absorbent structure according to claim 1,  
c h a r a c t e r i z e d i n  
that said layers (5'') are formed from separated strips of the web-shaped absorption  
material(-s).



5. Absorbent structure according to claim 4,  
characterized in  
that said separate strips have different widths and are placed in superposed relationship  
in such a way that the structure in a middle portion (9) comprises more layers than in  
5 the longitudinal edge portions (11), at which the structure has a higher density in the  
middle portion than in the edge portions.

6. Absorbent structure according to claims 4 or 5,  
characterized in  
10 that different types of absorption materials are used in the different layers (5'').

7. Absorbent structure according to any of the preceding claims,  
characterized in  
that said layers (5';5'') of the web-shaped absorption material(-s) (5) also have  
15 different lengths as seen in the longitudinal direction of the article.

8. Absorbent article such as a diaper, incontinence guard, sanitary napkin, wound  
dressing, bed protection and the like of the kind comprising a liquid pervious topsheet  
(1), a liquid impervious backsheet (2) and an absorbent structure (4) arranged  
20 therebetween,  
characterized in  
that the absorbent structure (4) is of a kind stated in any of claims 1-7.

9. Method for making an absorbent structure in an absorbent article such as a diaper,  
25 incontinence guard, sanitary napkin, wound dressing, bed protection and the like, at  
which at least two layers (5';5'') of one or more web-shaped absorption materials are  
placed superposed to each other,  
characterized in  
that said layers (5';5'') of the web-shaped absorption material(-s) have different widths  
30 as seen in the transverse direction of the article and that the absorbent structure (4)  
comprised of said layers is compressed to a thickness which is substantially the same

over the width of the structure, in such a way that the structure will have a higher density in the areas thereof where the layers overlap each other and a lower density in other areas.

5 10. Method as claimed in claim 9,  
characterized in  
that the web-shaped absorption material (5) is folded to the desired configuration for forming said layers (5'), after which compression to a substantially even thickness takes place.

10 11. Method as claimed in claim 10,  
characterized in  
that the web-shaped absorption material is folded in zigzag-shape in such a way that the structure in a middle portion (9) will comprise more layers than in the longitudinal edge  
15 portions (11), and that then the structure is compressed to an essentially even thickness at which it will have a higher density in the middle portion than in the edge portions.

12. Method as claimed in claim 9,  
characterized in  
20 that at least two separate pieces of the web-shaped absorption material(-s) of different widths are placed superposed to each other for forming said layers (5'), after which compression to an essentially even thickness takes place.

13. Method as claimed in claim 12,  
25 characterized in  
that said separate strips are placed on each other in such a way that the structure in a middle portion (9) comprises more layers than in the longitudinal edge portions (11), at which the structure is given a higher density in the middle portion than in the edge portions after compression to an essentially even thickness.

30

14. Method as claimed in claim 12 or 13,  
characterized in  
that different types of absorption materials are used in the different layers (5'').

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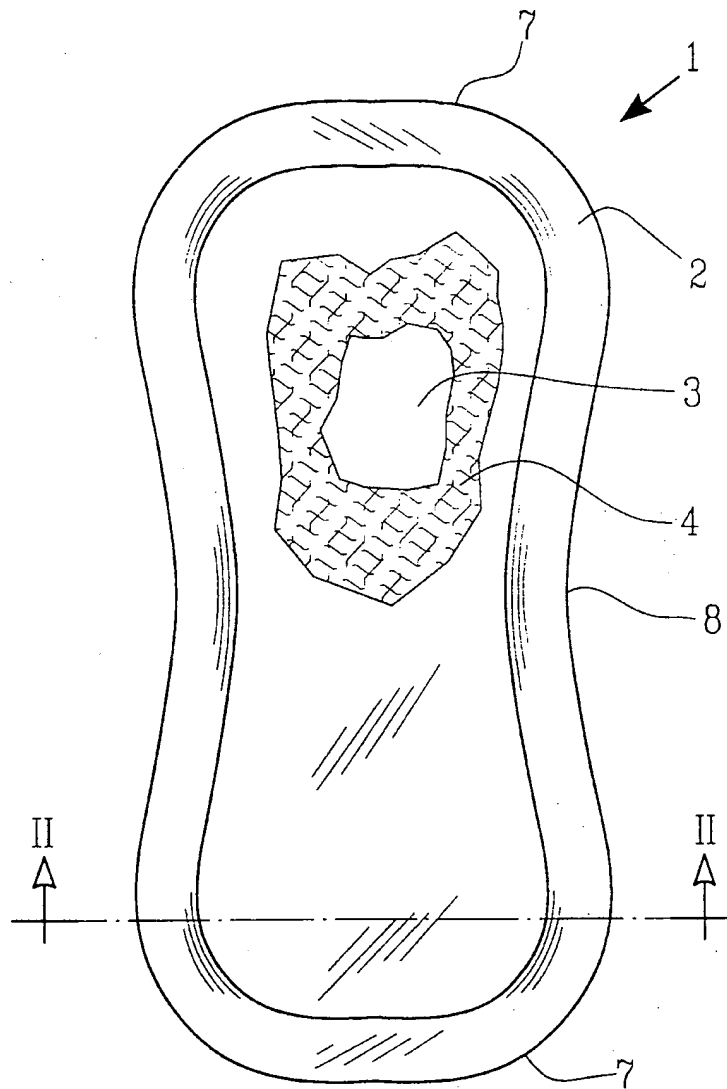


FIG. 1

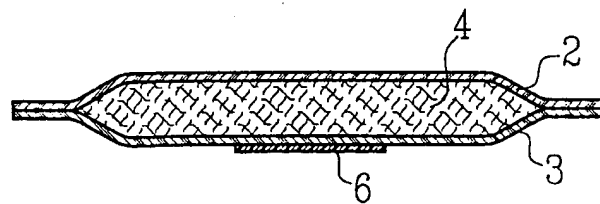


FIG. 2

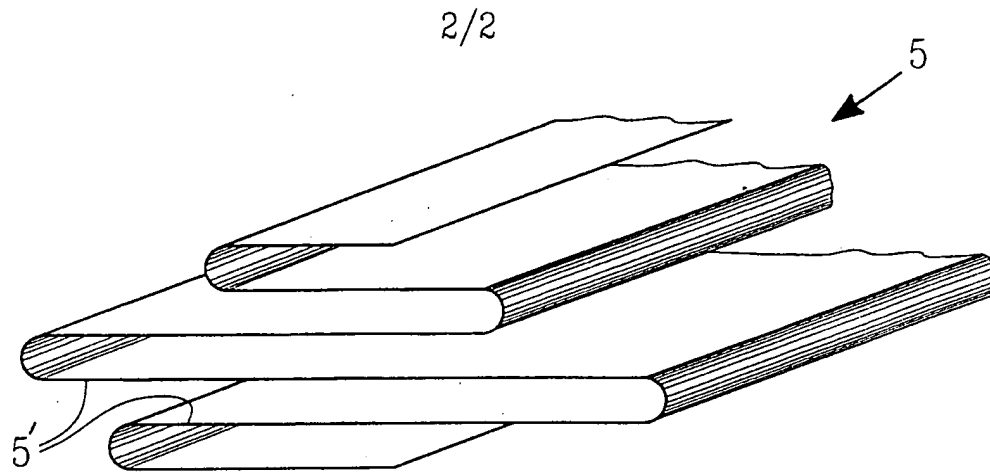


FIG. 3

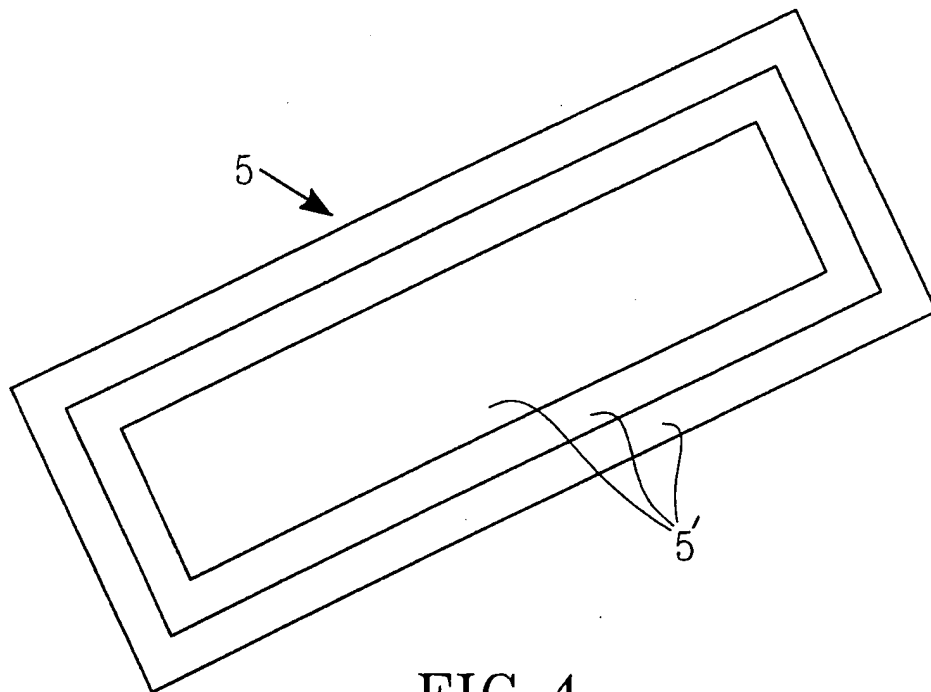


FIG. 4

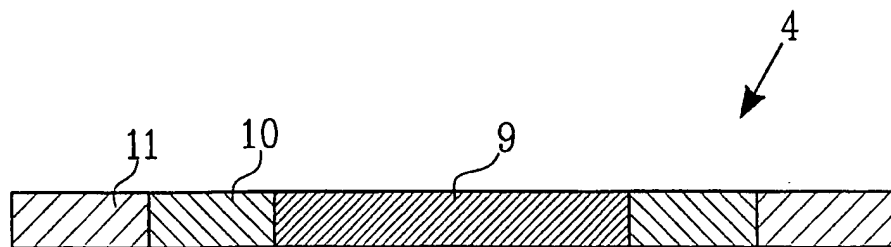


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/00964

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC6: A61F 13/15</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
<b>IPC6: A61F</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
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Y	US 4027672 A (KARAMI), 7 June 1977 (07.06.77), column 1, line 59 - column 2, line 30, figures 5a, 5b, claim 17, abstract --	1-3,9-11
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